

**Overview
of the**



**National
Fine Particulate Standard**

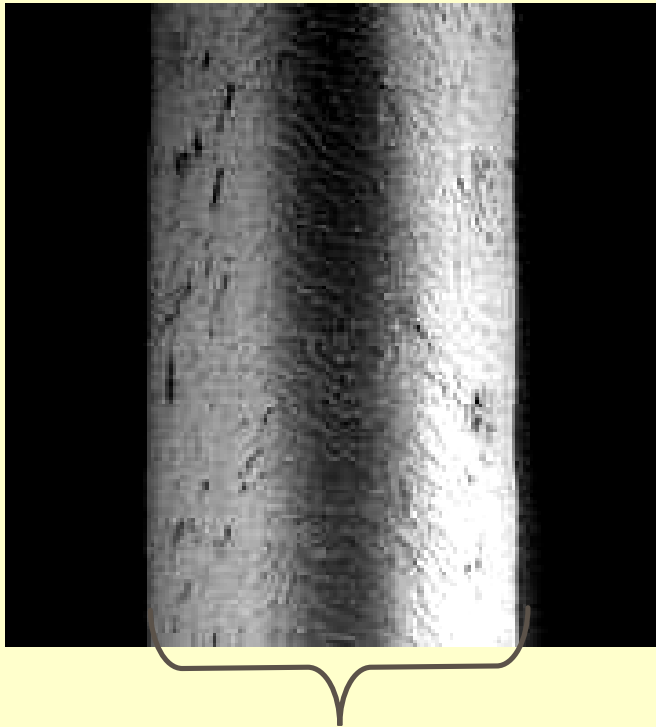


Timeline for PM2.5 Implementation Program

Action	Date
States/Tribes recommend designations	Feb. 2004
EPA responds with letters describing intended “modifications”	June 15, 2004
EPA proposes implementation rule	July 2004
EPA finalizes designations	Nov. 17, 2004
Effective date of PM2.5 designations	Feb. 2005
EPA finalizes implementation rule	March 2005
State/Tribal plans due	Feb. 2008*
Attainment dates	2010-2015

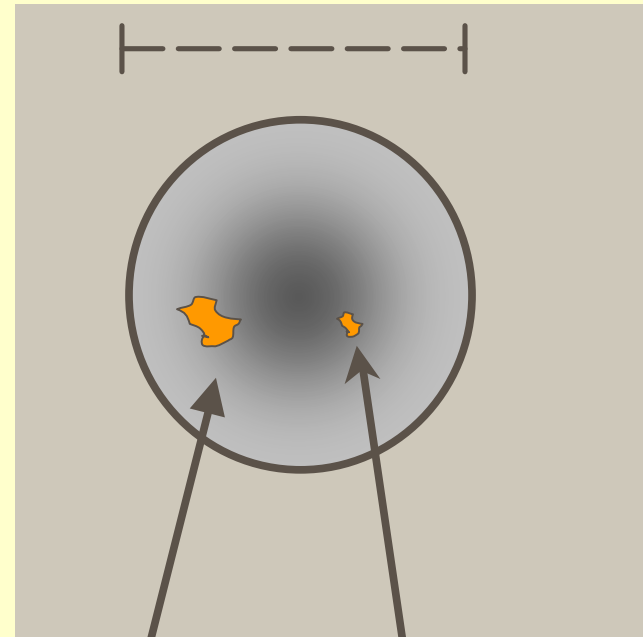
Particulate Matter: What is It?

A complex mixture of extremely small particles and liquid droplets



Human Hair (70 μm diameter)

Hair cross section (70 μm)





PM_{10}
(10 μm)

$\text{PM}_{2.5}$
(2.5 μm)

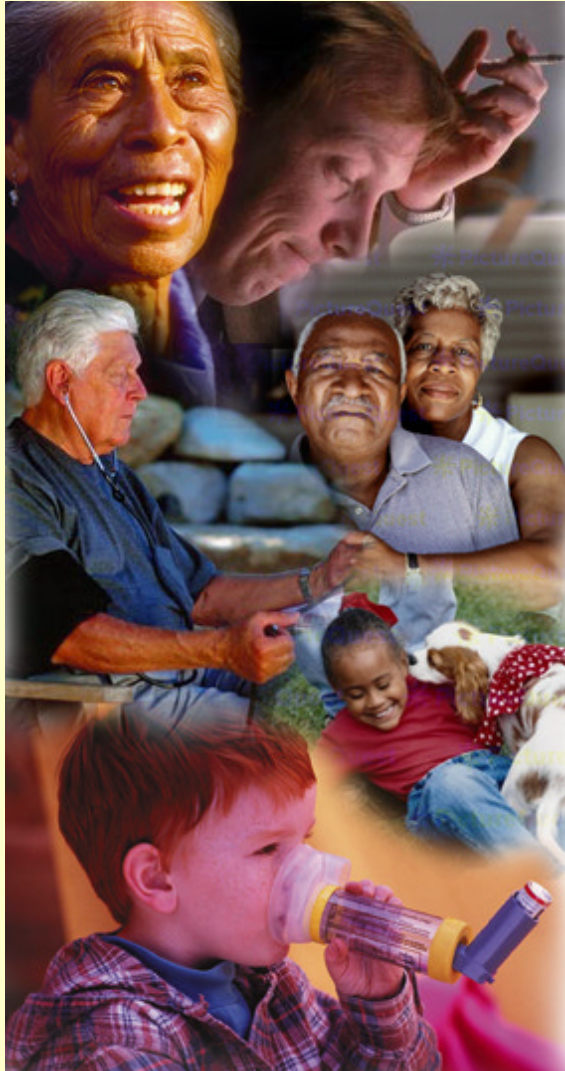


Fine Particle Standards

National standards

-  Annual: 15 micrograms per cubic meter, averaged over 3 years
-  24-hour: 65 micrograms per cubic meter, 98th percentile averaged over 3 years

Some Groups Are More at Risk



✂ People with heart or lung disease

✂ Conditions make them vulnerable

✂ Older adults

✂ Greater prevalence of heart and lung disease

✂ Children

✂ More likely to be active

✂ Breathe more air per pound

✂ Bodies still developing



Public Health Risks Are Significant

Particles are linked to:

- ✂ Premature death from heart and lung disease

- ✂ Aggravation of heart and lung diseases

 - ✂ Hospital admissions

 - ✂ Doctor and Emergency Room visits

 - ✂ Medication use

 - ✂ School and work absences

- ✂ Possibly linked to:

 - ✂ Lung cancer deaths

 - ✂ Infant mortality

 - ✂ Developmental problems, such as low birth weight, in children

 - ✂ Decrease in lung capacity as they mature

Wood-Burning Stoves



Power Plants



Heavy Duty Diesel Engines



Natural Sources



**Fine Particles Can Be
Emitted Directly or Formed
in the Air from Gases**

Cars and Trucks



Non-Road Vehicles



Forest Fires



Industrial Sources



Formed from
emissions of:

- (SO_x),
sulfur oxides
- (NO_x),
nitrogen oxides
- (VOCs)
volatile organic
compounds
- Ammonia

- Chemically & physically diverse substances
- Exist as liquid or solid particles

Fine Particles Reduce Visibility



✂ Example: Chicago in the summer of 2000.



✂ Left - a clear day: $\text{PM } 2.5 < 5 \mu\text{g}/\text{m}^3$

✂ Right - a hazy day: $\text{PM } 2.5 \sim 35 \mu\text{g}/\text{m}^3$








Monitoring for PM_{2.5}

FRM - Federal Reference Method

-  19 counties monitored
-  Monitors 24hr/3 day or 24hr/6 day schedule









TEOM - Tapered Element Oscillating Microbalance

-  4 counties now - additional 6 to be located
-  continuous hourly readings averaged over 24-hours
-  Hourly averages vs 24 hour average
-  Cannot be used for NAAQS determination
-  Will be used for reporting PM_{2.5} to Air Quality Index and Air Quality Mapping/Forecasting

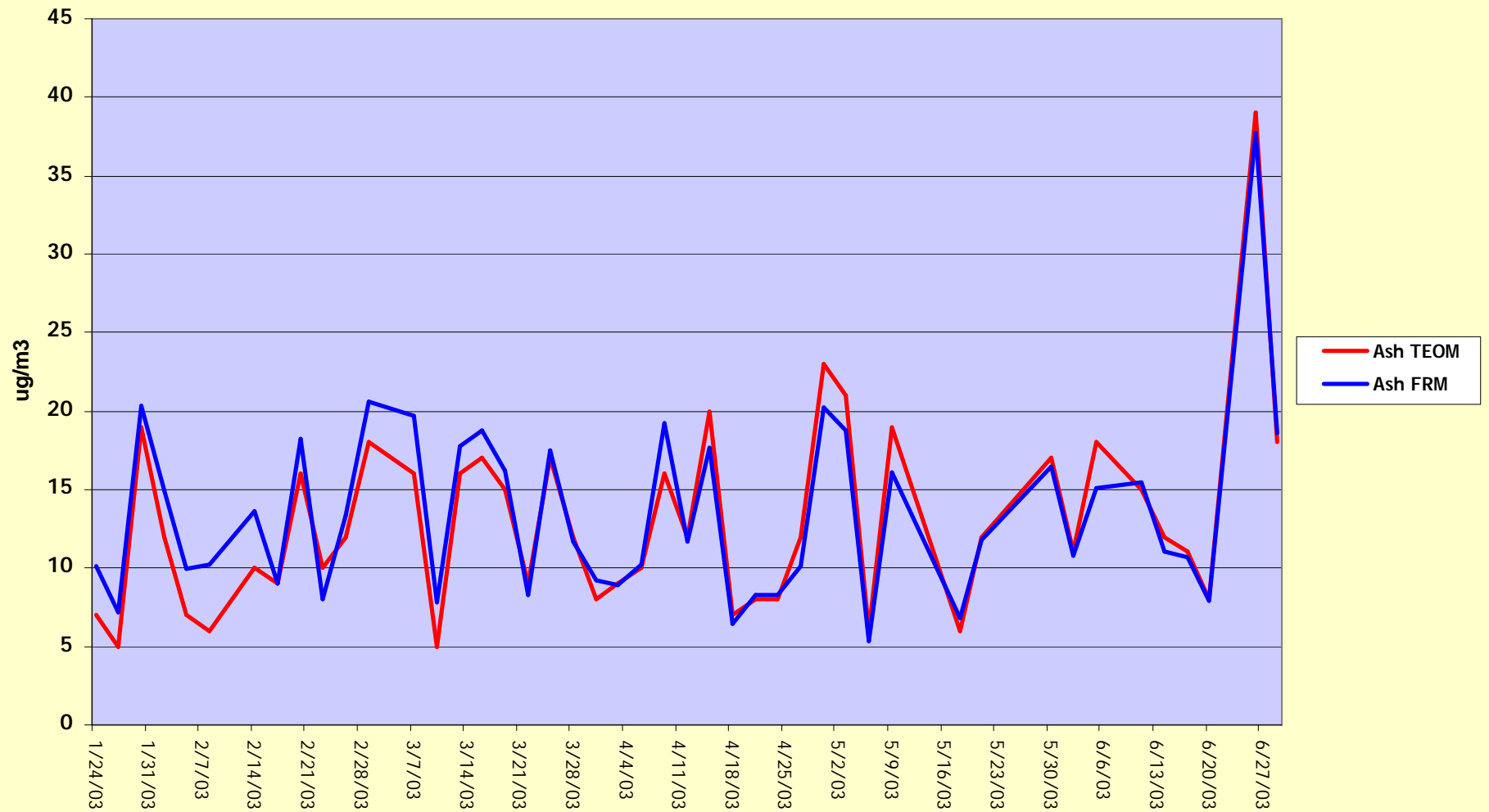


Monitoring for PM2.5 (continued)

Speciation Monitors

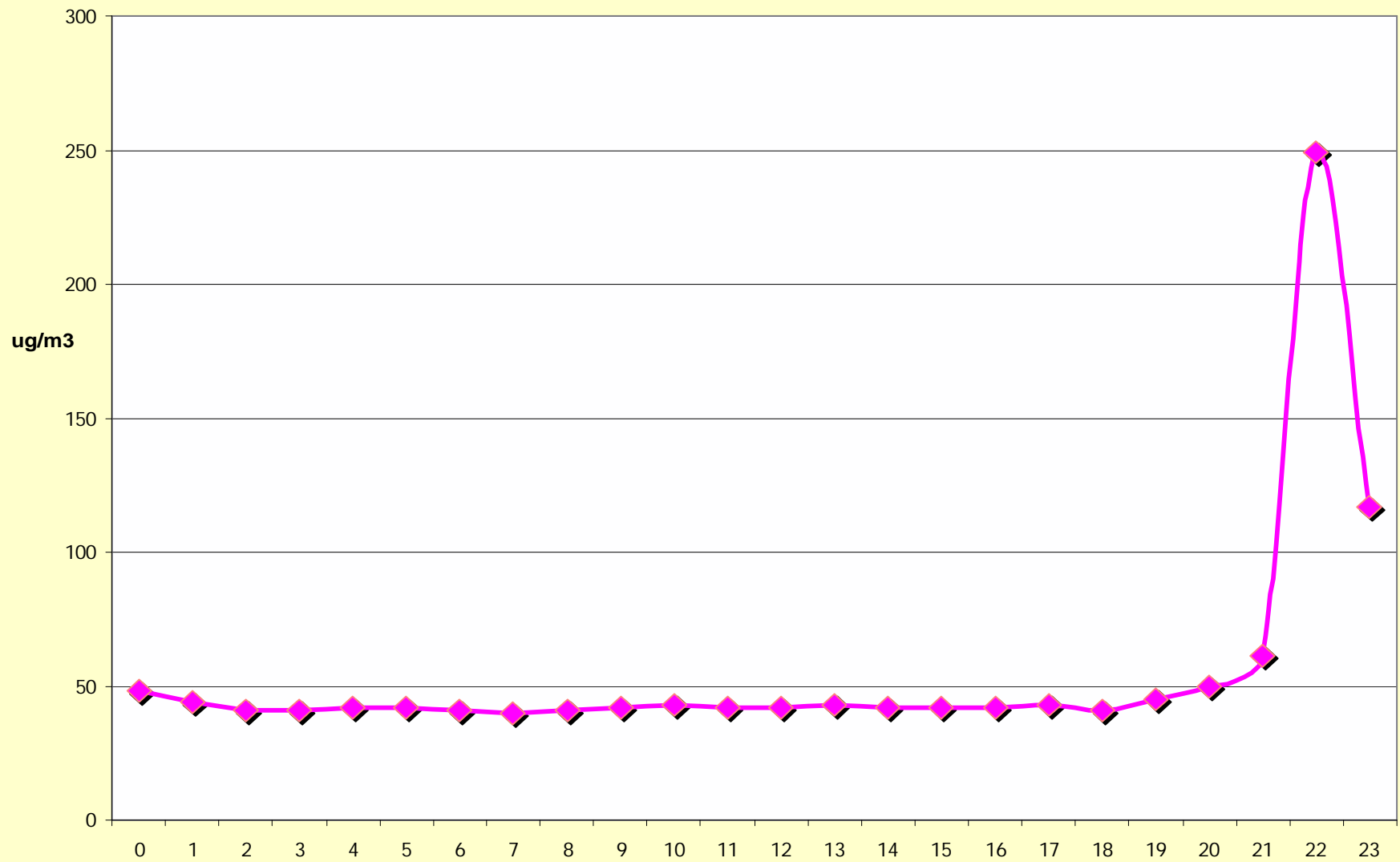
-  8 counties - typically major metro areas
-  Monitors 24hr/6 days
-  Used to determine chemical makeup of fine particulate
-  Part of the sequential monitoring system
 -  Determine how well the FRM monitors are performing
 -  constituency of the samples
-  Analysis performed by private lab thru EPA contract
 -  59 measurements including mass, nitrates, sulfates, ammonium, 3 types of carbon and 48 metals.

Ashland Site
PM2.5 FRM vs TEOM
January 24, 03 thru June 27, 03

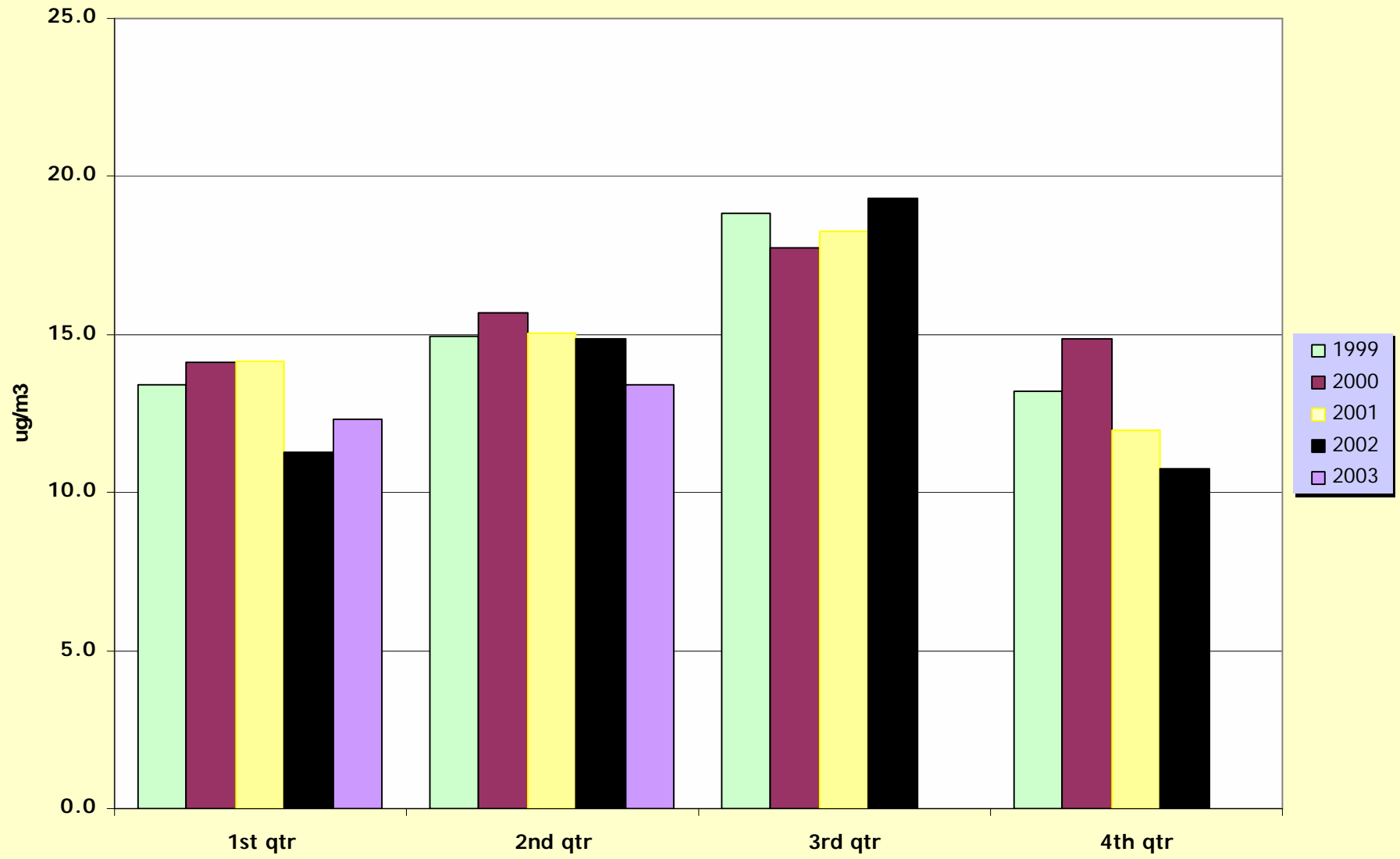


Ashland TEOM Chart

July 4, 2003



Statewide PM2.5 Averages by Quarter



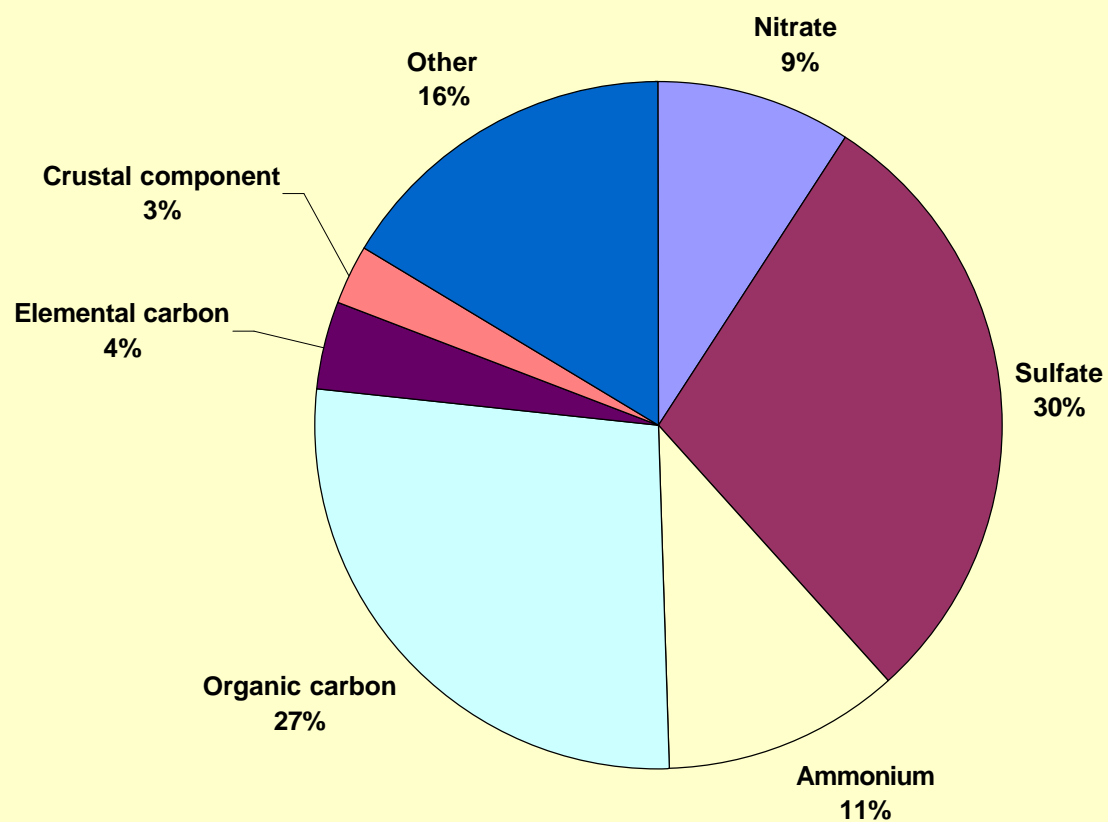
PM_{2.5} Speciation Data Comparison

Kentucky 2002 Distribution

ROUTINE Samples

Date(s): 1/14/02 - 6/25/02

Average Concentration ($\mu\text{g}/\text{m}^3$)



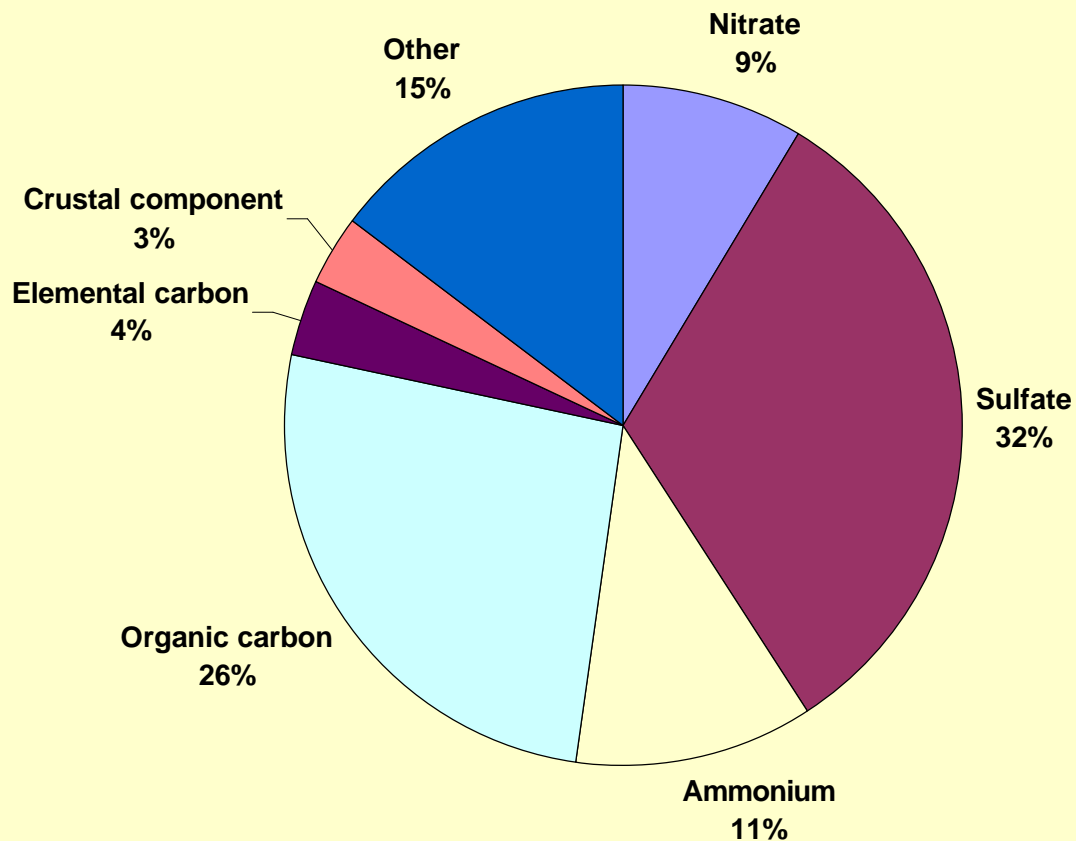
PM_{2.5} Speciation Data Comparison

Kentucky Speciation Distribution

Routine Samples

Date(s): 7/1/02 - 12/28/02

Average Concentration (µg/m³)





PM2.5 Designations – 9 Factors

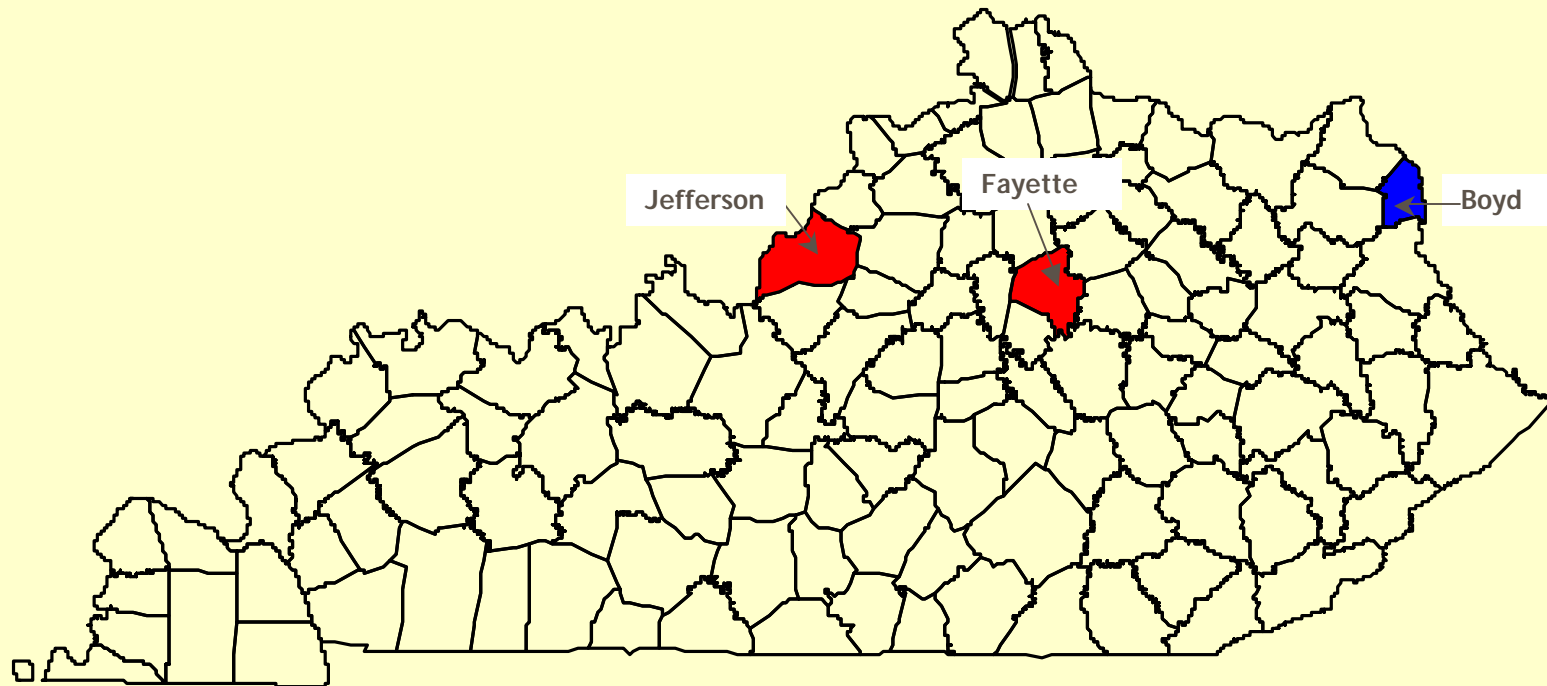
- ✍ Emissions in areas potentially included versus excluded from the nonattainment area
- ✍ Air quality in potentially included versus excluded areas
- ✍ Population density and degree of urbanization including commercial development in included versus excluded areas
- ✍ Traffic and commuting patterns
- ✍ Expected growth (including extent, pattern and rate of growth)
- ✍ Meteorology (weather/transport patterns)
- ✍ Geography/topography (mountain ranges or other air basin boundaries)
- ✍ Jurisdictional boundaries (e.g., counties, air districts, Reservations, etc.)
- ✍ Level of control of emission sources



PM_{2.5} Designations – Differences from Ozone Guidance

- ✍ Five main pollutants: direct PM (carbon, crustal material), SO₂, and ammonia in addition to NO_x and VOC
- ✍ PM_{2.5} is a year-round standard. Thus, contributions to nonattainment occur in all seasons and from many directions, not necessarily under one predominant wind direction.
- ✍ PM_{2.5} guidance did not include a factor taking specifically identifying future regional emissions reduction strategies

DAQ Proposed PM_{2.5} Nonattainment Counties in Kentucky





Summary

- ✍ Fine particles contribute to significant health and environmental effects.
- ✍ States submitted recommendations for their areas to EPA in February 2004.
- ✍ EPA intends to notify states of their nonattainment determinations by June 17, 2004.
- ✍ EPA intends to finalize the designations for the fine particle standards in November 2004.
- ✍ SIP submittals (plans to meet new standard) due three years later-- January 2008.



End

EPA Proposed PM2.5 Nonattainment Counties in Kentucky

